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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/885,626	06/20/2001	Hans Bruggemann	10537/126	4532

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EXAMINER

NGUYEN, TU MINH

ART UNIT	PAPER NUMBER
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3748

DATE MAILED: 07/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/885,626

Applicant(s)

BRUGGEMANN ET AL

Examiner

Tu M. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14-16, 19, 20 and 26-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14-16, 19, 20 and 26-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. An Applicant's Request for Continued Examination (RCE) filed on July 6, 2004 has been entered. As instructed from the RCE, an Applicant's Amendment filed on June 18, 2004 has been entered. Claims 14, 32, and 35 have been amended. Overall, claims 14-16, 19, 20, and 26-35 are pending in this application.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 14-16, 19, 20, 26-28, and 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Araki et al. (U.S. Patent 5,850,735) in view of Pinnavaia et al. (U.S. Patent 5,114,691) and legal precedent.

Re claims 14, 15, 32, and 35, as shown in Figure 9, Araki et al. disclose an emission control system configured for use with an internal combustion engine (1) and a method for operating such system, the system comprises:

- a particle filter (93); and

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- an arrangement disposed upstream from the particle filter and configured to at least reduce clogging of the particle filter by prevention of development of aluminum-containing sulfate ash upstream from the particle filter by one of transformation and maintenance of at least one of the compounds responsible for sulfate ash formation in the gaseous state, the arrangement including:

- a device (coating layers of alumina on the surface wall of the exhaust gas passages of the filter (93)) configured to collect at least a portion of the sulfate ash-forming compounds of sulfur contained in the exhaust gas (during a lean operation of the engine, SO_x in the exhaust gas is oxidized by the device to form ash-forming compounds (SO₃ and SO₄) of sulfur; SO₃ and SO₄ are then absorbed and collected onto the surface of the alumina layers (see lines 34-59 of column 15 and lines 5-16 of column 7)); and

- a device (91) configured to convert the collected sulfate ash-forming compounds of sulfur into gaseous compounds of sulfur that do not form ash (the oxidation catalyst (91) oxidizes the rich components in the exhaust gas so that the oxygen level in the exhaust gas is reduced and the temperature of the exhaust gas is raised to a level sufficiently high to maximize the transformation of the collected (SO₃ and SO₄) into gaseous compounds (SO₂) of sulfur (also see the Abstract)).

Araki et al., however, fail to disclose that in addition to alumina as a SO_x absorbent, the coating layers on the surface wall of the exhaust gas passages of the filter (93) further comprise at least one of zinc, alkaline, and earth alkaline as a SO_x absorbent; and that the arrangement is separate and spaced apart from the particle filter.

Pinnavaia et al. teach a process of removing SO_x from gas stream using heated layered double hydroxide (LDH) sorbents. It was found that a Mg₃Al LDH sorbent prepared with an alkaline-earth metal (Mg) and a transition metal (Fe) shows enhanced SO_x conversion efficiency over that of a LDH which is not prepared with an alkaline-earth metal (see Table 2 and lines 37-44 of column 9). It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized a Mg₃Al LDH sorbent taught by Pinnavaia et al. in the system and method of Araki et al., since the use thereof would have increased SO_x conversion efficiency.

Araki et al. disclose the claimed invention except for rearranging the coating layers of alumina on the surface wall of the exhaust gas passages of the filter (93) and the oxidation catalyst (91) into a different housing separate and spaced apart from the particle filter (93). It would have been obvious to one having ordinary skill in the art at the time the invention was made to redesign the system so that the coating layers of alumina and the oxidation catalyst (91) are built into a different housing spaced apart from the particle filter (93), since it has been held that constructing a formerly integral structure into various elements involves only routine skill in the art. *Nerwin v. Erlichman*, 168 USPQ 177, 179.

Re claim 16, in the modified system of Araki et al., the arrangement includes a SO_x collector (93).

Re claims 19 and 20, in the modified system of Araki et al., the arrangement includes an oxidation catalyst (91).

Re claims 26-28, in the modified system and method of Araki et al., the gaseous compounds of sulfur that do not form sulfate ash include SO₂.

Re claim 33, the modified method of Araki et al. further comprises the steps of:

- operating the emission control system in a normal operating phase with a lean exhaust composition to store sulfur contained in the exhaust gas; and
- operating the emission control system in a regeneration phase with a rich exhaust composition to release stored sulfur as at least one gaseous compound.

Re claim 34, in the modified method of Araki et al., the step of operating the emission control system in the regeneration phase includes the substep of raising an exhaust temperature to between 550°C and 700°C (lines 9-46 of column 10).

4. Claims 29 and 30, 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Araki et al. in view of Pinnavaia et al. and legal precedent as applied to claims 14 and 16, respectively, above, and further in view of Hirota et al. (U.S. Patent 6,233,927).

Re claims 29 and 30, the modified system of Araki et al. discloses the inventions as cited above, however, fails to disclose that the arrangement further includes an NOx collector.

As shown in Figure 5, Hirota et al. teach an exhaust gas purification device comprising a particle filter (7) that also absorbs SOx in the exhaust gas and a NOx collector (11) located upstream of the particle filter (7) to purify harmful NOx emissions in the exhaust gas. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the NOx collector taught by Hirota et al. in the modified system of Araki et al., since the use thereof would have reduced the emission of harmful NOx gas into the atmosphere.

Re claim 31, in the modified system of Araki et al., the arrangement includes an oxidation catalyst (91).

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Prior Art

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure and consists of two patents: Stroia et al. (U.S. Patent 6,735,940) and Molinier (U.S. Patent 6,758,036) further disclose a state of the art.

Communication

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (703) 308-2833.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (703) 308-2623. The fax phone number for this group is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-1148.

Tu M. Nguyen

TMN

Tu M. Nguyen

July 23, 2004

Patent Examiner

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